REMARKS

The Examiner rejected claim 1 under 35 U.S.C. § 112, ¶ 2 as being indefinite for failing to particularly point out and distinctly claim the subject matter that the applicant claims as its invention. Claim 1 has been amended and it is believed that the amendment overcomes this rejection.

Claims 1-7 and 3 were rejected under 35 U.S.C. § 103(a) over Moss. Applicant traverses the rejection. Moss discloses a multiple partitioned fluidized bed reactor which is entirely different from the present invention. The apparatus of Moss comprises a gasifier vessel 11 and an oxidizer vessel 40. Moss use $CaSO_4$ solids as bed solids. Liquid or solid fuel is oxidized in a gasifier vessel 11 to combustible fuel gas by reducing $CaSO_4$ to CaO by chemical and/or physical interaction between bed solids and the fuel. The oxidation of the reduced oxygen-donating solids is effected in an oxidizer vessel 40. A process for gasifying a fuel is conducted in the apparatus of Moss as described above. Applicant directs the Examiner's attention to the fact that in Moss, the bed height of bed 16 is the same as bed 40. Moss provides at col. 7, lines 59 - 61 provides: "The bed solids form a bed 41 in vessel 40 whose surface 42 is at about the same level as the surface 30 of bed 16." In the apparatus of Moss, therefore, movement of bed solids between bed 16 and bed 41 are effected by entrance port 19 having an inclined portion sloping downwardly and exit port 24 having an inclined portion sloping downwardly.

On the other hand, a fluidized bed reactor in accordance with the present invention has a proper difference in a fluidized bed height between an upstream and a downstream compartment without causing back mixing or substantially little back mixing. The present invention is entirely different from the multiple partitioned fluidized bed reactor of Moss in that the raw materials move through a connecting hole by a difference in a fluidized bed height from an upstream side compartment to a downstream side compartment. In order to solve the technical object to keep a proper difference in a fluidized bed height between compartments on the upstream and downstream sides without causing back mixing, the present invention has the specific features as clearly stated in claim 1, as amended.

In order to cause raw material fines to move from the upstream side to the downstream side in the connecting hole the following conditions must be met:

(1) Setting a vertical position of the connecting hole to ¼ or less of the fluidized bed height

(2) Forming a downflow comprising dense ore fines in the vicinity of an inlet of the connecting hole

(3) Increasing a thickness of the downflow comprising the dense ore fines in the vicinity of the inlet of the connecting hole

(4) Forming a downflow comprising the dense ore fines in the vicinity of the outlet of the connecting hole.

Claim 1 of the present invention includes all of the foregoing conditions and Moss does not teach or suggest the invention of claim 1.

Moss describes at col. 9, in lines 41-44 that "the downflow of defluidized solids at the right-hand face of partition 55 promotes a corresponding upflow of bed solids in regions near the wall 14, as indicated by arrows 59." It, therefore, would not have been obvious for one of ordinary skill in the art to place the gas injecting nozzles at a certain distance of the connecting port as claimed by claim 1. Moss does not achieve the technical advantages of the present invention, and Moss does not teach or suggest how to do so.

In accordance with the present invention, it is possible to provide a fluidized bed reactor in which raw material fines can be smoothly moved from the upstream side toward the downstream side in the connecting hole. Accordingly, it is possible to realize a fluidized bed reactor having low equipment and running cost, a significant advantage over Moss.

The Examiner rejected claim 12 under 35 U.S.C. § 103(a) over Moss in view of Butt. It is respectfully suggested that with the discussion of Moss above, claim 12 also patentably distinguishes over Moss in view of Butt. The Examiner also rejected claim 13 under 35 U.S.C. § 103(a) over Moss in view of Butt and further in view of Voegeli. In view of the discussion of Moss above, it is respectfully suggested that claim 13 patentably distinguishes over Moss in view

of Butt and further in view of Voegeli. The Examiner also rejected claim 14 under 35 U.S.C. § 103(a) over Moss in view of Butt and further in view of Wietzke. In view of the discussion of Moss above, it is respectfully suggested that claim 14 patentably distinguishes over Moss in view of Butt and further in view of Wietzke.

New claims 15 and 16 have been added to more fully claim that which Applicant regards as its invention.

If the Examiner believes that a teleconference would be of value in expediting the allowance of the pending claims, the undersigned can be reached at the telephone number listed below. This response has been filed within the three-month statutory time for response and it is, therefore, believed that no petition or payment for extension of fees is due. If, however, it is believed that any additional fees are necessary, the Commissioner is hereby authorized to charge or credit any such fees or overpayment to Deposit Account No. (Reference #490042-87).

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Respectfully submitted,

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APPENDIX A - CLAIM AMENDMENTS

Serial No.: 09/622,089
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1. (Currently Amended) A reactor system, comprising a multi-partitioned fluidized bed reactor of a bubbling bed type ~~for performing~~ configured to perform a reaction for treating ore fines while fluidizing raw material fines fed from one side surface of the reactor by a reaction gas injected from ~~a large number of~~ a plurality of gas injecting nozzles provided on a gas distributor placed on a lower portion in the reactor, thereby discharging a product from the other side surface of the reactor, wherein a fluidized bed is partitioned into a plurality of compartments by partition plates, a connecting hole for moving the raw ~~materials~~ material fines by a difference in a fluidized bed height from an upstream side compartment to a downstream side ~~compartment~~ compartment is provided in the lower part of the partition plate, and an average moving speed of the raw ~~materials~~ material fines passing through the connecting hole is 500 mm/second or less, the multi-partitioned fluidized bed reactor meeting conditions that:

a vertical position of the connecting hole has a height which is 1/4 of ~~a~~ the fluidized bed height or less;

a length of the connecting hole is 100 mm or more;

~~in a case where the gas injecting nozzle injects~~ wherein the plurality of gas injecting nozzles include a vertical gas injecting nozzle that is configured to inject a gas upward in ~~an almost~~ a substantially vertical direction, a distance between an inlet of the connecting hole and an end surface of an upstream side of said vertical nozzle is greater than 150 mm and a distance between an outlet of the connecting hole and an end surface of a downstream side of said vertical nozzle is greater than 50 mm;

~~in a case where the gas injecting nozzle injects~~ wherein the plurality of gas injecting nozzles include a horizontal gas injecting nozzle that is configured to inject a gas in ~~an almost~~ a substantially horizontal direction, the distance between the inlet of the connecting hole and the end surface of an upstream side of said horizontal nozzle is greater than 200 mm and the distance between the outlet of the connecting hole and the end surface of the downstream side of said horizontal nozzle is greater than 100 mm;

~~in a case where the gas injecting nozzle injects~~ wherein the plurality of gas injecting nozzles include an oblique gas injecting nozzle that is configured to inject a gas obliquely downward, the distance between the inlet of the connecting hole and the end surface of the upstream side of said oblique nozzle is greater than 200 mm and the distance between the outlet of the connecting hole and the end surface of the downstream side of said oblique nozzle is greater than 100 mm; and

an angle formed by a line connecting a corner portion of an upper surface of the connecting hole and a gas injecting port with respect to a horizontal plane is greater than an angle of repose of the raw material fines in any of openings on upstream and downstream sides of the connecting hole.

2. (Currently Amended) The multi-partitioned fluidized bed reactor of Claim 1 wherein a lower surface of the connecting hole is positioned above a gas injecting portion of the plurality of gas injecting nozzles.

3. (Original) The multi-partitioned fluidized bed reactor of Claim 1 or 2 wherein a diameter of the opening on the upstream side of the connecting hole is gradually reduced toward the downstream side.

4. (Original) The multi-partitioned fluidized bed reactor of Claim 1 or 2 wherein a lower surface portion of the opening on the upstream side of the connecting hole protrudes from an end surface of the partition plate toward the upstream side.

5. (Original) The multi-partitioned fluidized bed reactor of Claim 4 wherein a corner portion of an upper surface of a protruding portion is obliquely cut.

6. (Original) The multi-partitioned fluidized bed reactor of Claim 4 wherein an upper surface of a protruding portion is slanted downward from the upstream side toward the downstream side.

7. (Currently Amended) The multi-partitioned fluidized bed reactor of ~~Claims 1, 2 or 3~~ Claim 1 or 2 wherein the connecting hole is slanted downward from the upstream side toward the downstream side.

8. (Currently Amended) The multi-partitioned fluidized bed reactor of Claim 6 ~~or 7~~ wherein an angle of slant is greater than an angle of repose of the raw material fines.

9. (Original) The multi-partitioned fluidized bed reactor of Claim 1 wherein a lower surface portion of the opening on the downstream side of the connecting hole protrudes from an end surface of the partition plate toward the downstream side.

10. (Original) The multi-partitioned fluidized bed reactor of Claim 9 wherein a corner portion of an upper surface of a protruding portion is obliquely cut.

11. (Original) The multi-partitioned fluidized bed reactor of Claim 1 wherein the connecting hole protrudes from both end surfaces of the partition plate on the upstream and downstream sides.

12. (Original) The multi-partitioned fluidized bed reactor of Claim 1 wherein one or more gas injecting nozzles are provided in a middle portion of the connecting hole, and a reaction gas is injected from the gas injecting nozzle into the connecting hole.

13. (Original) The multi-partitioned fluidized bed reactor of Claim 12 wherein a porous material is used as a tip of the gas injecting nozzle.

14. (Original) The multi-partitioned fluidized bed reactor of Claim 12 wherein a tip of the gas injecting nozzle is obliquely bent from the upstream side toward the downstream side.

15. (New) The multi-partitioned fluidized bed reactor of claim 3, wherein the connecting hole is slanted downward from the upstream side toward the downstream side.

16. (New) The multi-partitioned fluidized bed reactor of claim 7, wherein an angle of slant is greater than an angle of repose of the raw material fines.

AMENDMENTS TO THE DRAWINGS

A substitute page for Figs. 24-25 is attached. Fig. 25 is now designated as prior art.

Please delete the page following Figs. 24-25.